REMARKS

Claims 1, 3-12, and 14-22 are rejected under 35 USC §103 as being unpatentable over Matsuura et al., WO 02/10843 A2.

Independent claim 1 has now been amended to recite a photonic bandgap microcavity that includes a deformable membrane structure that can experience strain using a plurality of thin-film actuators of at least 0.2% on the deformable membrane. The deformable membrane has semiconductor materials that do not exhibit piezoelectric effects. A photonic bandgap waveguide element is formed on the deformable membrane structure having a defect region that breaks the periodicity of a plurality of periodic holes so that when the deformable membrane structure is strained, the photonic bandgap waveguide element is tuned to a selective amount due to the strain experienced in the defect region of the photonic bandgap waveguide element and the microcavity is not permanently disfigured.

Independent claim 12 has also been amended to recite a method of forming a photonic bandgap microcavity, including forming a deformable membrane structure that can experience strain using a plurality of thin-film actuators of at least 0.2% on the deformable membrane. The deformable membrane has semiconductor materials that do not exhibit piezoelectric effects. The method also includes forming a photonic bandgap waveguide element on the deformable membrane structure having a defect region that breaks the periodicity of a plurality of periodic holes so that when the deformable membrane structure is strained, the photonic bandgap waveguide element is tuned to a selective amount due to the strain experienced in the defect region of the photonic bandgap waveguide element and the micro cavity is not permanently disfigured.

Matsuura et al. '843 describes a photonic crystal and a photonic device having a photonic crystal, configured by changing its physical geometry in at least one region to alter light propagation and/or confinement. The configuring means may include electrostrictive, piezoelectric or magnetostrictive components of the photonic crystal, or an actuation device affixed to the photonic crystal.

However, Matsuura et al. '843 discusses photonic crystals and supports that have piezoelectric effects. The top and bottom electrodes of Matsuura et al. '843 show this limitation. The deformable membrane structure comprises semiconductor materials that do not exhibit piezoelectric effects. The requirement is the attachment of piezoelectric materials to the deformable membrane structure.

In contrast, the present invention translates the strain from the piezoelectric elements to the deformable membrane, and then to the photonic crystals elements. This permits much larger design flexibility in designing and selecting the piezoelectric elements, the deformable membrane and the photonic crystals elements separately, before combining them into the final device.

Moreover, tuning is performed in the recited claimed invention by providing strain to the defect region of the photonic crystal waveguide element. Matsuura et al. '843 describes using an electric field or voltage to introduce, remove, or rotate the various defects in a photonic crystal. Also, Matsuura et al. '843 describes changing the periodicity in the photonic crystal waveguide using pillars. Note claims 1 and 12 clearly recite that the claimed invention aims to use the strain associated with the thin-film actuator to produce strain in the defect region of the photonic crystal waveguide element for tuning. Matsuura et al. '843 describes using straining elements,

such as actuators, to change the inherent periodic arrangements of defects states and holes, but Matsuura et al. '843 is silent on the issue of introducing strain to the defect region of a photonic crystal waveguide element for tuning.

Furthermore, Matsuura et al. '843 describes a piezoelectric element being significantly deformed. It is clear that the deformed membrane, as recited in claims 1 and 12, is being strained and not elongated or compressed. The deformed membrane of the invention is not designed to be permanently disfigured, but only strained. Therefore, Matsuura et al. '843 does not render obvious claims 1 or 12.

As to claims 3-11 and 14-22, they are dependent on claims 1 and 12, respectively. Therefore, claims 3-11 and 14-22 are also allowable for the same reasons argued with respect to claims 1 and 12.

Claims 2 and 13 are rejected under 35 USC §103 as being unpatentable over Matsuura et al. '843 in view of Caracci et al., US 6,445,838.

Caracci et al. '838 describes a bulk optical silica fiber.

Given that claims 2 and 13 are dependent on claims 1 and 12, the reasons argued for claims 1 and 12 are also applicable here. Also, Caracci et al. '838 does not address the deficiencies of Matsuura et al. '843. Therefore, the proposed combination of Matsuura et al. '843 and Caracci et al. '838 does not render obvious claims 2 and 13.

In view of the above amendments and for all the reasons set forth above, the Examiner is respectfully requested to reconsider and withdraw the objections and rejections made under 35 U.S.C. §§§ 102 and 103. Accordingly, an early indication of allowability is earnestly solicited.

If the Examiner has any questions regarding matters pending in this application, please feel free to contact the undersigned below.

Respectfully submitted,

Peter S. Stecher
Registration No. 47,259
Gauthier & Connors LLP
225 Franklin Street, Suite 2300
Boston, Massachusetts 02110
Telephone: (617) 426-9180
Extension: 126